

# **HABITAT LIMITING FACTORS**

## **YAKIMA RIVER WATERSHED**

### **WATER RESOURCE INVENTORY AREAS 37 - 39**

#### **FINAL REPORT**

**WASHINGTON STATE  
CONSERVATION COMMISSION**

**Donald Haring**

**December 2001**

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## ACKNOWLEDGEMENTS

Completion of this report would not have been possible without the support and cooperation of the Technical Advisory Group (TAG), who contributed an extensive amount of their valuable time and were the source of the majority of information included in this report. Their expertise and familiarity with the sub-watersheds within the Yakima Basin (Water Resource Inventory Areas (WRIA) 37, 38, and 39), and their interest and willingness to share their knowledge, allowed the completion of this report. There were separate TAGs for the upper Yakima and tributaries (WRIA 39), and for the lower Yakima and Naches including tributaries (WRIs 37 and 38). In addition, there were numerous individual contacts outside of the formal TAG meetings to get salmonid habitat and stock information. Several participants were involved with both of the TAGs. Following is an alphabetized list of TAG participants and other consulted individuals:

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I extend particular appreciation to several people. Thanks to Kevin Lautz, who preceded me as the Conservation Commission Regional Technical Coordinator working on this report. He had organized the TAG and much of the watershed literature prior to my involvement. Special thanks to Anna Lael, Jim Cummins, Pat Monk, Scott Nicolai, Onni Perala, Brent Renfrow, Richard Visser, and Bruce Watson for contributing their extensive expertise, time, and energy to development of the report, and for coordinating review and comments within their organizations. It is their collective experience and knowledge in these watersheds that provided much of the qualitative habitat assessment information. Special thanks to Paul Huffman and the Yakima/Klickitat Fisheries Project for allowing use of their FTP website to post drafts of the report for review and comment.

I thank those TAG participants that contributed a great amount of time and effort in reviewing preliminary report drafts and providing comments that improved the content, accuracy, and readability of the report. In particular, several TAG participants provided text segments that have been included directly in the report. Their contributions were critical to the thoroughness, accuracy, and completion of the report, and are greatly appreciated.

In addition, special thanks to Ron McFarlane (Northwest Indian Fisheries Commission (NWIFC)) for preparation of the GIS maps included in this report, and to Jake Cherberg, who assisted me as an unpaid intern in the mapping and documentation of fish distribution in the Yakima Basin. I also express thanks to Carol Smith for providing the text included in the Role of Healthy Habitat chapter, Devin Smith (NWIFC, now with Skagit System Cooperative) for coordinating the development of the Habitat Condition Rating Criteria, Kurt Fresh (WDFW) for developing much of the language in the Introduction chapter and for providing technical assistance to all of the Regional Technical Coordinators, and to Ed Manary for coordinating the Habitat Limiting Factors Analysis process and providing the extensive resources and support necessary to complete these reports.

Completion of this report was truly a collaborative effort. Unfortunately, the extent and variety of contributions cannot be adequately captured in the authorship reference for this report.

## ACRONYMS AND ABBREVIATIONS USED IN THIS REPORT

The following list provides a guide to acronyms or abbreviations used in this report:

BPA	Bonneville Power Administration
BOR	U.S. Bureau of Reclamation
CBSP	Columbia Basin Systems Planning (the 1990 Yakima Subbasin Plan)
cfs	cubic feet per second (a measure of water flow)
CWA	Clean Water Act
EF	East Fork
ESA	Endangered Species Act
IFIM	Instream Flow Incremental Methodology
KCCD	Kittitas County Conservation District
KID	Kennewick Irrigation District
KRD	Kittitas Reclamation District
LWD	Large Woody Debris
m	meter
mg/L	milligrams/Liter
mi	mile
mi <sup>2</sup>	square miles
MF	Middle Fork
NF	North Fork
NWIFC	Northwest Indian Fisheries Commission
NYCD	North Yakima Conservation District
RM	River Mile
RID	Roza Irrigation District
SASSI	Salmon and Steelhead Stock Inventory
SF	South Fork
SSHIAP	Salmon and Steelhead Habitat Inventory Assessment Project
SSI	Salmonid Stock Inventory
SVID	Sunnyside Valley Irrigation District
TAG	Technical Advisory Group
USFWS	U.S. Fish and Wildlife Service
WDF	Washington Department of Fisheries
WDFW	Washington Department of Fish and Wildlife
WF	West Fork
WRIA	Water Resource Inventory Area
YKFP	Yakima/Klickitat Fisheries Project
YN	Yakama Nation
yr	year

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## EXECUTIVE SUMMARY

*Key physical components of a functioning aquatic ecosystem include complex habitats consisting of floodplains, streambanks, channel structure, and water flows. Habitat complexity is created and maintained by rocks, sediment, large wood, and favorable water quantity and quality. Upland and riparian areas influence aquatic ecosystems by supplying sediment, large wood, and water. Disturbance processes such as landslides and floods are important mechanisms for delivery of wood and bedload to streams. Streams are disturbance dependent systems, and in order to maintain aquatic ecosystems, natural disturbance regimes must be maintained. The natural function of aquatic ecosystems in the Yakima watershed has been affected by intense forest, agricultural, and water management. (excerpted from USFS 1997)*

Section 10 of Engrossed Substitute House Bill 2496 (Salmon Recovery Act of 1998), directs the Washington State Conservation Commission, in consultation with local government and treaty tribes to invite private, federal, state, tribal, and local government personnel with appropriate expertise to convene as a Technical Advisory Group (TAG). The purpose of the TAG is to identify limiting factors for salmonids. Limiting factors are defined as “conditions that limit the ability of habitat to fully sustain populations of salmon, including all species of the family Salmonidae.” Although the report is titled as a habitat limiting factors analysis (per the legislation), it is important to note that the charge to the Conservation Commission in ESHB 2496 does not constitute a full limiting factors analysis in the true scientific sense. A full habitat limiting factors analysis would require extensive additional scientific studies for each of the subwatersheds in the Yakima Basin (Water Resource Inventory Areas (WRIA) 37-39 (see location in Figure 1)). Analysis of hatchery, hydro, and harvest impacts would also be part of a comprehensive limiting factors analysis; these elements are not addressed in this report, but are being considered in other forums.

The upper Yakima River watershed originates near the crest of the Cascade Range upstream of Keechelus Lake on Snoqualmie Pass, the Naches River watershed originates near the crest at Chinook and White passes, and the Satus/Toppenish River drainages originate in the Simcoe Mountains east of Mt. Adams (see Figure 1). The Yakima River flows 344 km (214 miles) southeastward from Keechelus Dam to its confluence with the Columbia River at RM 335.2. The Yakima Basin drains an area of 15,900 square km (6,155 square miles) and contains about 3058 km (1,900 river miles) of perennial streams (YSS 2001 DRAFT).

The Yakima Basin was historically one of the primary anadromous salmonid production areas within the Columbia River Basin (Tuck 1993). The Yakima Basin currently supports spring chinook, fall chinook, coho, summer steelhead, bull trout, other resident salmonids, and other non-salmonid fish species. Summer chinook and anadromous sockeye were historically numerous, but have been extirpated from the watershed. Coho were extirpated in the Yakima Basin, but are currently being reintroduced. Known, presumed, and historic/potential distribution of anadromous salmonids and bull trout are shown on the individual species maps included in the separate Maps file included with this report, and supporting data in Appendix A.

The status of identified salmon, steelhead, and bull trout stocks in the Yakima Basin is shown in Table 1. Of the estimated 1,900 miles of perennial streams in the Yakima Basin, anadromous

Figure 1: Location of the Yakima River watershed (WRIAs 37-39) in Washington State

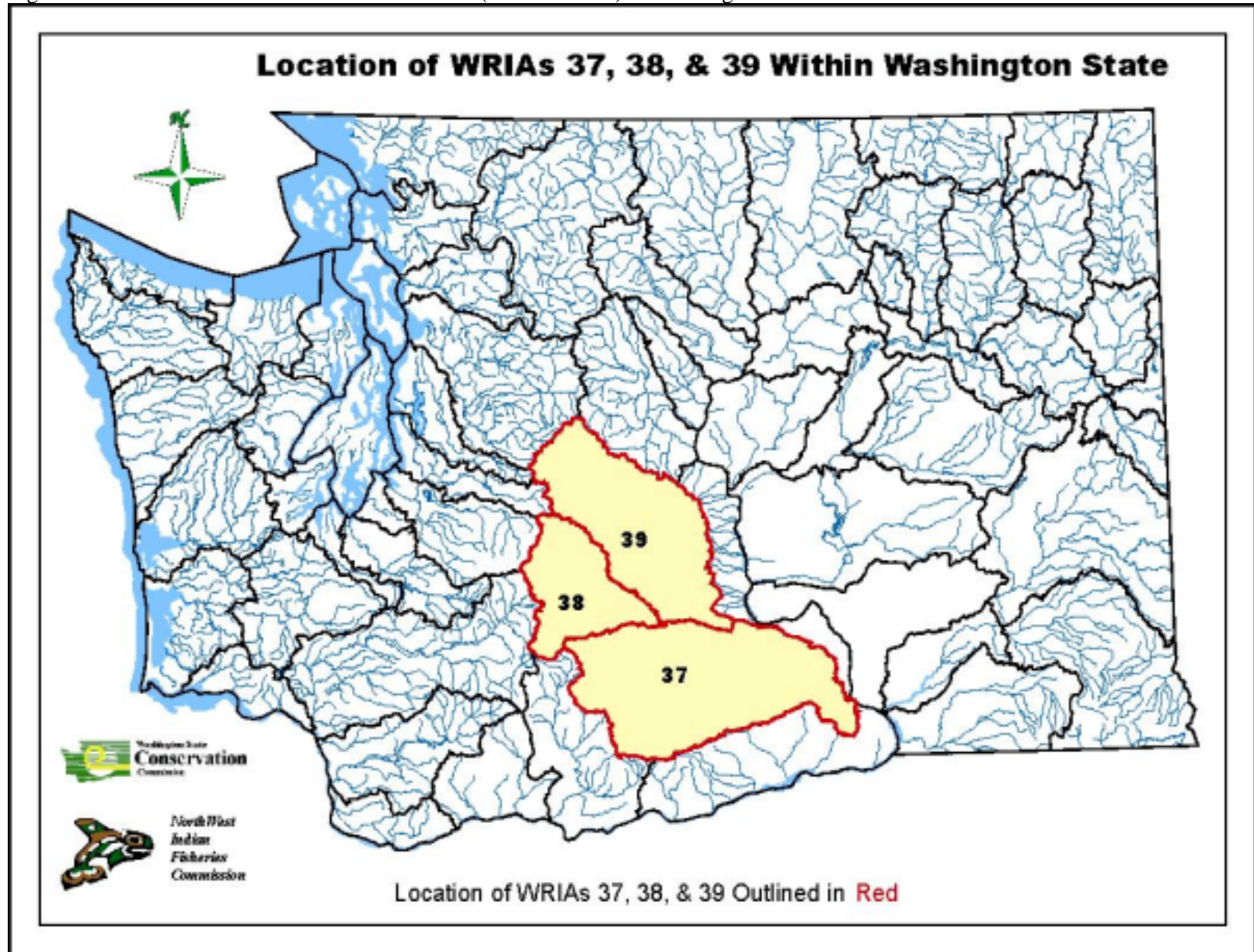


Table 1: Yakima Basin Salmon, Steelhead, and Bull Trout Stock Designations and Associated Status		
<b>Stock</b>	<b>SASSI Status</b>	<b>ESA Listing Status</b>
Upper Yakima spring chinook, and the stocks	Depressed	Not warranted
Naches spring chinook	Depressed	Not warranted
American River spring chinook	Depressed	Not warranted
Yakima summer chinook	Extirpated	Not recognized
Yakima upriver bright fall chinook	Healthy	Not warranted
Marion Drain fall chinook	Healthy	Not warranted
Yakima sockeye (upper Yakima and Bumping River)	Extirpated	Not recognized
Yakima coho	Extirpated but being reintroduced	Not recognized
Yakima summer steelhead	Depressed	Threatened
Yakima bull trout/dolly varden	Critical	Threatened
Ahtanum Creek bull trout/dolly varden	Critical	Threatened
Naches bull trout/dolly varden	Critical	Threatened
Rimrock Lake bull trout/dolly varden	Healthy	Threatened
Bumping Lake bull trout/dolly varden	Depressed	Threatened
NF Teanaway bull trout/dolly varden	Critical	Threatened
Cle Elum/Waptus lakes bull trout/dolly varden	Unknown	Threatened
Kachess Lake bull trout/dolly varden	Critical	Threatened
Keechelus Lake bull trout/dolly varden	Critical	Threatened

Table 2: Salmonid habitat utilization in the Yakima River watershed (distances in river miles)						
Species	Known Presence	Known/ Presumed Presence	Presumed Presence	Potential/ Historic Presence	Total Current/ Potential/Historic Habitat	Percent of Total Potential/Historic Habitat Currently Occupied
Spring Chinook	467		55	393	915	57%
Fall Chinook	172		42	Unknown	214	Unknown
Coho	335			1017	1352	25%
Summer Steelhead		1024		356	1380	74%

salmonids currently occupy or historically occupied nearly 1,400 miles (Table 2), with additional areas occupied by bull trout. Anadromous salmonids returning to the upper Yakima River (Easton reach) migrate nearly 550 miles from the mouth of the Columbia River upstream to their spawning grounds.

Suitable gradients for salmonids exist in many streams nearly to the headwaters, with suitable gradient extending nearly to the cascade crest in many streams. Vegetative cover in the Yakima Basin ranges from coniferous forest in the upper elevations to shrub-steppe in the lower



watershed; annual precipitation ranges from 80 inches to 140 inches in the upper portions of the watershed to 10 inches or less in the lower watershed (YSS 2001 DRAFT). Peak flows are typically associated with snowmelt runoff in the spring and early summer, although storm related peak flows also are common through the winter months. Natural low flows are common in late-summer/early-fall, although the natural hydrology in many of the streams is profoundly affected by irrigation storage and delivery throughout the watershed.

Of particular note in the Yakima Basin are the scale, extent, and timing of reductions in anadromous salmonid production. Although it seems to be a common view that the dramatic decline in anadromous salmon is the result of fisheries and Columbia River hydropower operations, the declines actually preceded these impacts. Original runs of salmon and steelhead in the Yakima Basin have been estimated at approximately 800,000 returning adults (Northwest Power Planning Council 1989). By 1900, it is estimated that the number of returning adults had been reduced by 90%, compared to the historic runs (Davidson 1965, as cited in Tuck 1993). The Salmon and steelhead runs continued to decline, and by 1920 only 11,000 adults are estimated to have returned to the Yakima River Basin (BOR 1979, as cited in Tuck 1993), a reduction of >98% of the historic run. The first hydropower dam on the Columbia River that could have adversely affected Yakima River salmon and steelhead was Bonneville Dam, constructed in 1938 (Tuck 1993). Obviously, the dramatic decline occurred prior to hydropower impacts. Other than the screening of one small irrigation diversion on the Naches River in 1928, none of the hundreds of diversions in the Yakima watershed were screened until the Works Progress Administration (WPA) program of 1934-1940, under President Franklin Roosevelt's "New Deal" (Tuck 1995, as cited in YSS 2001 DRAFT). The probability that a smolt could survive emigration from the Yakima River or its tributaries was extremely small, and the bulk of the initial decline can be attributed primarily to smolt entrainment in irrigation diversions (Tuck 1993; Earnest Brannon Sr. 1929, as referred by Easterbrooks). Although the Columbia River commercial fisheries in the late-1800s/early-1900s likely contributed in part to the decline of Yakima River salmon and steelhead, the peak harvest in the Columbia River occurred in 1911, and large harvests continued until 1920 (Craig and Hacker 1940, as cited in Tuck 1993), all well after the observed collapse of adult returns to the Yakima River (90% reductions by 1900, as noted above). The high harvests of the early 1900s appear to have been supported by Columbia River tributary watersheds other than the Yakima. The peak harvest of coho in the lower Columbia River occurred in 1925, by which time only a remnant coho run existed in the Yakima River Basin (Tuck 1993). It is apparent that the collapse of anadromous salmonid production in the Yakima Basin preceded the construction of hydropower dams, and was associated with factors other than harvest, although harvest likely also contributed to some extent.

Salmonid habitat conditions and productivity have been impacted by a variety of land and water use actions in the watershed. These land and water uses contributed to the development of the important agricultural, forestry, and mining industries in the Yakima Basin, but historical watershed modifications were often implemented with little/limited consideration of impacts to salmonid resources. The dramatic decline in salmon and steelhead production in the Yakima Basin is most likely associated with the combination of habitat-related impacts in the late-1800s/early 1900s, including:

- Irrigation development – irrigation diversions were constructed on the mainstem Yakima and many of the tributaries, most of which were constructed without upstream fish passage facilities or downstream juvenile fish screening, and many that dewatered reaches downstream of the diversion
- Construction of irrigation storage reservoirs – dams at the outlets of Keechelus Lake, Kachess Lake, Cle Elum Lake, and Bumping Lake were built without upstream fish passage, precluding access and anadromous salmonid production from approximately 70

miles of highly productive fish habitat upstream of the dams (construction of these dams resulted in extirpation of sockeye in the Yakima Basin); Tieton dam at the outlet to Rimrock Reservoir blocked upstream access to approximately 43 miles of upstream habitat, including inundation of the highly productive historic floodplain complex at McCallister Meadows on the Tieton River

- Splash damming (log drives) – from 1879 through approximately 1915, splash dams were constructed on tributaries in the upper Yakima (Cle Elum and Teanaway rivers), and the channels cleared in order to drive large lografts downriver to lumber mills, resulting in a significant decline in suitable salmonid habitat in those basins.
- Mining – discovery of gold in Swauk Creek in the 1870s led to extensive placer mining that created extensive alteration of the channel, substrate, and banks, and caused extensive turbidity that affected salmonid production in Swauk Creek, and likely downstream in the Yakima River
- Removal of beaver – beaver dams were historically common throughout the watershed; beaver trapping in the mid-1800s resulted in a loss of beaver dams that helped maintain hydrology during dry periods, resulting in an associated loss of valuable juvenile salmonid rearing habitat, and possibly creating additional impairments to upstream fish passage
- Grazing – extensive grazing occurred in the late 1800s, particularly in higher elevation subwatersheds

The largest of these impacts was likely associated with early irrigation development. Adverse habitat impacts associated with transportation development (railroad, highways, roads), urbanization, and other agricultural and logging activities have also occurred in the watershed, but many of these occurred after the period of severe decline in salmonid abundance.

Data included in this report include formal habitat inventories or studies specifically directed at evaluating fish habitat, other watershed data not specifically associated with fish habitat evaluation, and personal experience and observations of the watershed experts that participated in the TAG. The analysis of habitat conditions in the Yakima Basin (WRIAs 37-39) and associated action recommendations is based on these data. Although many of the habitat data/observations in this report may not meet the highest scientific standard of peer reviewed literature, they should nevertheless be considered as valid, as they are based on the collective experience of the watershed experts that are actively working in these drainages. Although there are a significant number of past studies and reports on these watersheds, a large number of salmonid habitat “data gaps” remain, which will require additional specific watershed research or evaluation. The most critical data gap needs are identified in the Data Gaps chapter of this report.

Although some of the historic actions that led to the dramatic decline in salmonid presence in the Yakima Basin have ceased or been reduced, and significant restoration efforts have been implemented to address some of these elements, there are numerous habitat-related problems remaining through the Yakima Basin that continue to limit salmonid productivity potential.

These impacts include:

- Fish Access – Adult and juvenile salmonids have been precluded from historic spawning and rearing habitats. Significant progress has been made in providing fish passage and juvenile screening at the major mainstem irrigation diversions, however, there remain a large number of irrigation diversions (primarily on tributaries) and other structures (e.g., culverts, dams) that preclude (either due to the structure or lack of flow downstream) upstream adult and/or juvenile salmonid access, and which may preclude access to suitable habitat downstream of the barrier (e.g, reservoir dams)(historic/potential habitat that is not currently accessible is indicated on the species distribution maps in the

separate Maps file included with this report). The lack of upstream fish passage facilities at the major storage reservoirs has precluded anadromous salmonid presence from approximately 113 miles of highly productive historic habitat (Bumping–12 miles; Rimrock–43 miles; Cle Elum–35 miles; Kachess–14 miles; Keechelus–9 miles). There are ongoing efforts to address upstream fish passage and screening on culvert and irrigation barriers in the tributaries. In addition, access to productive side-channel rearing habitats is precluded by structures that constrict the floodplain or activities that have eliminated previously connected surficial aquifers. Bull trout access to spawning streams is impeded or blocked during periods of drought due to a combination of low stream flows and extreme reservoir drawdown.

- **Floodplain Modifications** – Salmonid access to productive floodplain side-channel habitats has been lost and the productivity of floodplain areas has been reduced as a result of floodplain constrictions. Natural floodplain function has been impaired through much of the watershed by structures (dikes, levees, roads, railroads) that restrict floodplain extent, by channel incision that disconnects the channel from the floodplain, by extensive mining within the floodplain, and by channelization and construction of drains that eliminate or interrupt hyporheic or surficial side-channel flow.
- **Channel Conditions** – The loss of channel complexity, cover, bank stability, and presence of pools has adversely affected spawning and rearing habitat. Channel condition and complexity has been dramatically altered through most of the watershed by channelization, loss of large woody debris (LWD) and pools, and by loss of bank stability and channel complexity due to a variety of land use practices.
- **Substrate Conditions** – Gravel substrate quality has been adversely affected by increased presence of fines (<0.85mm) and loss of suitable gravels; these impacts affect spawning and rearing success and benthic productivity. Gravel substrates are impaired in many areas of the watershed by significant presence of fine sediments, and in other areas by loss of suitable spawning and rearing substrate due to altered hydrology (e.g., Tieton River) and channel simplification. Channel and substrate stability have also been affected by altered hydrology from land uses in the watersheds. The severe reductions in returning adult spawners also has implications to substrate conditions, as spawners have been shown to maintain their own habitat by flushing fine sediments from the gravels as they create redds, and actually maintaining or increasing the wetted perimeter as they spawn on the fringe of the wetted channel.
- **Riparian Conditions** – Impaired riparian function has resulted in increased water temperature, loss of bank stability, loss of instream cover, and loss of LWD recruitment to streams. Riparian function has been severely impaired through much of the basin by removal of riparian vegetation; by structures (dikes, roads, railroads, etc.) that preclude riparian vegetation growth; by channel incision, drains, and channelization that lower the water table in riparian areas; and by altered hydrology that either dewater riparian zones or excess flows/altered timing of peak flows that preclude natural regeneration of woody riparian vegetation (e.g., cottonwoods).
- **Water Quality** – Salmonids require cool, clean water for effective spawning and rearing; cold water temperatures are particularly critical to maintaining bull trout populations. Water temperatures naturally rise in many streams/rivers in the watershed in late-summer, potentially to levels that may impair habitat suitability. Naturally elevated water temperatures may be further exacerbated by human induced impacts, including loss of riparian function, altered hydrology, and increased erosion/fine sediment delivery. Increased water temperatures in the mainstem and many tributaries affect habitat suitability for spawning and rearing, and also increase suitability for predator species that are known to predate on juvenile salmonids. High presence of toxic substances (e.g.,

pesticides) has been detected in sediment and fish tissue samples, particularly in mainstem and tributary areas with agricultural return flows. Significant recent progress has been made in reducing turbidity and associated presence of toxics in irrigation return flows, but beneficial effects to instream habitat and fish health have not yet been assessed.

- **Water Quantity** – Salmonids require suitable instream flows at specific times of the year for effective spawning, incubation, and rearing; they have adapted over history to the natural flow regime within the Yakima Basin. However, the natural hydrologic regime in the Yakima Basin has been extensively altered by irrigation delivery. Instream flows are eliminated or reduced downstream of irrigation diversions throughout the basin, and during periods where instream flow is reduced to achieve desired irrigation storage, impairing salmonid spawning and rearing. Much higher than normal flows occur in the Yakima and Naches rivers during summer/early-fall, affecting newly-emerged salmonids and riparian regeneration potential. Although the hourly/daily instream flow variation associated with irrigation storage releases has been significantly improved, there is still potential to strand juvenile salmonids in side-channels and pockets on the channel fringe. The flip-flop water management scheme, designed specifically to protect spawning spring chinook in the upper Yakima River (Keechelus-Easton reaches), may have significant unintended consequences to other species and watersheds; review of the implications of this strategy is warranted. In addition, upper Yakima River water is directly conveyed through many streams and drains either for irrigation delivery, or as operational or tailwater spill from the large irrigation canals, resulting in false attraction of adult spawners that would otherwise likely be returning to the upper watershed. False attraction to lower watershed streams is of particular concern, as habitat conditions are typically poor in these streams and resulting production from spawning in these areas is thought to be very low.
- **Lakes** – The historic large natural glacial lakes, and their associated tributaries, were important contributors to total salmonid production in the Yakima Basin. Anadromous salmonid production has been eliminated from approximately 113 miles (Bumping–12 miles; Rimrock–43 miles; Cle Elum–35 miles; Kachess–14 miles; Keechelus–9 miles) of highly productive habitat upstream of the major storage reservoirs, resulting in the extirpation of anadromous sockeye, and significantly affecting total production of the other anadromous species and bull trout. Water level fluctuation in the major storage reservoirs in the watershed affects the productivity within the reservoir, and potentially in the watershed downstream of the reservoirs. Fluctuating reservoir levels have also resulted in altered characteristics of the delta fan at the mouths of tributaries to the reservoirs, creating fish passage difficulties for adult bull trout and other species attempting to migrate into the tributaries to spawn.
- **Biological Processes** – The return of marine-derived nutrients (particularly nitrogen and phosphorous) from salmon carcasses provides an important nutrient source to the oligotrophic waters and riparian areas in the higher elevations of the watershed. The loss of marine-derived nutrients, in conjunction with impairment of floodplain, channel, substrate, and riparian functions adversely affects the productivity of aquatic invertebrates that form the base for the freshwater food web. These in turn limit the salmonid production potential of streams within the basin. Surplus hatchery salmon carcasses are being placed in some of the headwater streams to provide an enhanced nutrient base; although this effort does enhance productivity of certain streams, it does not duplicate the distribution and benefits that would be achieved through natural spawning.

Habitat condition has been rated (good, fair, poor, data gap) for each of these habitat elements for mainstem reaches and tributaries in the Yakima Basin, generally using the Habitat Rating

Standards in Appendix C. The habitat condition rating summary is presented in the Assessment of Habitat Limiting Factors chapter.

The most critical habitat concerns (unranked) by WRIA appear to be:

WRIA 37

- Altered hydrograph, resulting in lower flows than normal through the irrigation period; lack of instream flow downstream of Prosser
- High water temperatures and associated high predation rates on juvenile salmonids in the lower Yakima River
- High fine sediment delivery, and associated toxics, primarily from irrigation return flows (significant reductions in fine sediment delivery have been achieved in recent years)
- Fish passage barriers associated with irrigation diversions (particularly in Toppenish and Ahtanum creeks) and lack of screening
- Lack of habitat complexity (little LWD, channel simplification, lack of pools)
- Loss of floodplain function through the Wapato reach and through Yakima-Union Gap
- Impaired riparian function due to land use impacts and altered hydrology that impairs riparian regeneration
- False attraction due to irrigation operational spills and return flows

WRIA 38

- Impaired habitat quality and rearing utilization resulting from altered hydrology effects (from flip-flop) on the Tieton River and lower Naches River
- Impaired instream flow in the reach downstream of the Wapatox diversion dam
- Lack of anadromous fish passage at Tieton and Bumping dams
- Impaired floodplain and riparian function on the Naches River and several tributaries
- Lack of habitat complexity (little LWD, channel simplification, lack of pools)

WRIA 39

- Fish passage barriers (lack of instream flow, lack of fish passage) and lack of screening associated with irrigation diversions, impairing fish passage into suitable habitat in upper portions of tributaries
- Impaired floodplain function on Yakima River and many tributaries
- Altered hydrology, resulting in unnaturally high flows through the irrigation season, and substantially reduced spring runoff in most years
- Impaired riparian function on many tributaries
- Lack of habitat complexity (lack of LWD, channel simplification, lack of pools)
- High fine sediment delivery, and associated toxics, primarily from irrigation return flows (significant reductions in fine sediment delivery have been achieved in recent years)
- Lack of anadromous fish passage at Cle Elum, Keechelus, and Kachess dams

However, the salmonid production potential from the Yakima Basin is not nearly as bleak as the information above might indicate. The watershed has existing production potential, and significant habitat restoration potential. There are still areas with highly productive habitat conditions (e.g., American River, the Keechelus and Easton reaches of the upper Yakima River, etc.), and other areas where high quality habitat exists upstream of existing fish passage barriers (e.g., Ahtanum Creek, Big Creek, etc.). Efforts to provide upstream fish passage and juvenile screening at irrigation diversions, and recent efforts to reduce the delivery of fine sediment from

irrigation return flows have improved spawning access, juvenile salmonid survival, and quality of rearing habitat. Reductions in flow variation over short periods of time downstream of the storage reservoirs and diversion dams has reduced the potential for stranding and associated mortality of juvenile salmonids; however, the potential for stranding and associated mortality still exists. Stream corridor acquisitions and voluntary actions have led to improved channel and riparian condition. These collective efforts, in conjunction with enhancement efforts through the Yakima/Klickitat Fisheries Project, have contributed to significant increases in adult returns in the last few years. These increased returns clearly show the benefits of efforts to date, and should provide incentive to increase habitat protection and restoration efforts throughout the watershed. There is extensive salmonid habitat restoration potential and opportunity remaining. Yakima Basin salmon recovery efforts have achieved excellent benefits to date, but there is much progress still to be achieved.

Prioritized habitat action recommendations are provided for each stream in which salmonid presence has been identified, following the discussion of identified salmonid habitat concerns. Those action recommendations at the top of the list are considered to provide greater restoration benefit potential than those towards the bottom of the list, or those on the top of the list may need to be done first to better ensure the effectiveness of those further down the list. The TAG did not prioritize or rank between watersheds on the basis of salmonid productivity potential resulting from habitat restoration. Cross-watershed prioritization should be addressed through Lead Entity development of salmon restoration strategies for the Yakima Basin. There is general support for the tenets of 1) protect the best remaining habitat, 2) restore those habitat areas that are still functioning, and 3) restore severely impaired non-functioning habitat where feasible. Habitat restoration projects should be reviewed on their own merits, and should be prioritized/ranked on the basis of their anticipated benefit to protecting/restoring salmonid production. Habitat protection/restoration project proposal ranking should consider whether the project addresses the cause of an identified habitat limiting factor, where the habitat need addressed by the project ranks in the prioritized action recommendations list for that stream, how the project complements other protection/restoration actions, and how the project complements identified habitats needing protection. Project ranking should also consider projects where willing landowners and partnerships can increase the effectiveness/efficiency of the restoration project. Habitat conditions vary between different reaches of a stream; restoration proposals should consider the potential benefits of the proposal in relation to habitat conditions likely to be encountered elsewhere in the watershed.

**Protection/restoration of salmonid resources cannot be accomplished by watershed habitat restoration projects alone.** It is unlikely that we will be able to resolve the salmon predicament using the same land management approaches that got us into it. We will need to look at the watershed with a clear new vision. Salmonid recovery will require a combination of efforts, including:

- land use regulations alone will not be effective, habitat restoration and resource protection will also require landowner commitment, participation, and stewardship
- revision, implementation, and enforcement of land use ordinances that provide protection for natural ecological processes in the instream, and riparian corridors
- protection of instream and riparian habitat that is currently functioning, particularly key habitat areas, and
- restoration of natural instream and riparian ecological processes where they have been impaired.

This report represents a “snapshot-in-time” portrayal of salmonid habitat conditions. This information can and should be used by the Lead Entity (HB2496) and the Watershed Planning Unit (HB 2514) in the development of salmonid habitat protection and restoration strategies. It should be considered a living document, updated periodically with additional habitat assessment data and habitat restoration successes, as information becomes available.